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Ice Station SHEBA: A year on the ice comes to an end

HANOVER, N.H.—On October 11, 1998 the Canadian Coast Guard Icebreaker *Des Groseilliers* broke free of the icy embrace of the Arctic ice pack, bringing to a close the year-long drift of Ice Station SHEBA. Purposely frozen into the ice pack in October 1997, the *Des Groseilliers* drifted with the Arctic ice pack for the past year serving as the base of operations for a team of scientist studying the Surface Heat Budget of the Arctic Ocean (SHEBA). SHEBA is a \$19.5 million research effort funded by the National Science Foundation (NSF) and the Office of Naval Research (ONR). Its goal is to understand the feedback processes of the Arctic climate and use this understanding to improve global climate models.

During the past year, 11 different CRREL researchers worked at Ice Station SHEBA, logging anywhere from 2 to 5 months on the ice. Their studies have focused on the atmospheric boundary layer, the snow cover and the sea ice. SHEBA is unique in that there was a large interdisciplinary team of researchers studying the surface heat balance over an entire annual cycle. "We had an opportunity to see the whole movie; winter, spring, summer and fall. And we got to know all the characters and how they interact; the atmosphere, the clouds, the ice and the ocean," said Don Perovich SHEBA Chief Scientist and CRREL geophysicist.

Scientists were surprised in October 1997 that the ice cover was thinner and the upper ocean water fresher than previously found in this area. Winter at SHEBA was cloudy, windy and mild, due in part to the influence of El Niño. The coldest temperature recorded was a relatively balmy -44° F on December 31, 1997. Summer brought more than two months of temperatures near 32° F. There was continual daylight, but very little sunshine as fog and clouds were commonplace. The combination of a mild winter and a long summer resulted in an overall thinning of the ice. The strong winds and the thin ice combined to move the floe farther than anyone expected. Originally frozen in about 300 miles north of Prudhoe Bay (75 N, 142 W), the floe drifted with ice pack along a meandering, 1,600-mile path ending up about 500 miles to the northwest (80 N, 166 W).

There were ample challenges during the year-long drift of Ice Station SHEBA. At the very beginning, conditions made it difficult to find a suitable piece of ice thick enough to support the scientific operations. In the midst of winter, with temperatures of -30° F and continual darkness, the ice cover fractured turning SHEBA into the Venice of the north. Extra caution was needed in spring due to frequent visits by polar bears. During the summer melt season, the thin ice and cold water made life vests more than a fashion accesory for those working on the ice.

While the drift of Ice Station SHEBA has concluded, the SHEBA Program continues as the science team begins the exploration of this extraordinary dataset. CRREL scientists will be analyzing their results and developing computer models to improve the treatment of the Arctic in climate models.

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